Instruction Manual

HI 38084
Total Exchangeable Acidity Test Kit

PEWA
Messtechnik GmbH

Weidenweg 21
58239 Schwerte

Tel.: 02304-96109-0
Fax: 02304-96109-88
E-Mail: info@pewa.de
Homepage : www.pewa .de

Dear Customer,

Thank you for choosing a Hanna Product.

Please read the instruction sheet carefully before using the test kit. It will provide you with the necessary information for correct use of the kit. If you need additional information, do not hesitate to e-mail us at tech@hannainst.com.

Remove the chemical test kit from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify your Dealer or the nearest Hanna office immediately.

Each kit is supplied with:

- Potassium Chloride, 1 box (380 g);
- Phenolphthalein Indicator, 1 bottle with dropper (20 mL);
- HI 38084C-0 Titration Solution, 1 bottle (120 mL);
- Demineralizer Bottle with filter cap for about 12 liters of deionized water (depending on the hardness level of water to be treated);
- 1 2-mm soil sieve;
- 1 large funnel;
- filter paper discs ∅ 120 mm (100 pcs);
- 1 plastic test tube (50 mL) with screw cap;
- 1 calibrated plastic vessel (50 mL);
- 2 sample cups (2 g);
- 1 sample cup (1 g);
- 1 plastic pipette (1 mL);
- 1 brush;
- 1 spoon.

Note: Any damaged or defective item must be returned in its original packing materials.

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SPECIFICATIONS

Range	0 to 2.5 meq/100 g
Smallest Increment	0.1 meq/100 g
Analysis Method	Titration
Sample Size	5 g of soil
Number of Tests	100
Case Dimensions	235x175x115 mm (9.2x6.9x4.5")
Shipping Weight	1027 g (36.2 oz.)

Note: TEA is Total Exchangeable Acidity; meq/100 g is milliequivalent per 100 grams.

SIGNIFICANCE AND USE

The total exchangeable acidity (TEA) is a measure of the amount of acidic cations (hydrogen, aluminum, iron and manganese) present in soil. It is expressed in milliequivalent per 100 grams (meq/100 g) of soil. The more acidic it is a soil, the lower the soil pH value will be. Soils in humid regions normally accumulate increasing amounts of exchangeable acidity as they get older. Soil acidity may develop toxicity that can damage or kill plants.

CHEMICAL REACTION

The extraction method is the potassium chloride method.

The acidic cations are firstly leached from the soil and then titrated with a standard alkali. The reaction endpoint is visually indicated by a color change (from colorless to pink) of the indicator reagent.

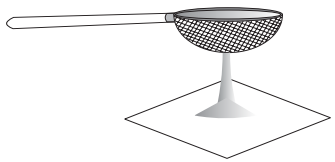
SAMPLING PROCEDURE

WHEN TO TEST YOUR SOIL

Soil should be tested not only when the plant appears to be unhealthy (yellow leaves or stunted growth), but prior to seeding, planting and fertilizing as well as when other material such as manure or compost has been added.

SAMPLING

1) Soil Sample Extraction
   - Within a large homogeneous area, take 1 or 2 samples per 1000 m^2 (0.25 acre).
   - Even for smaller areas, 2 samples are recommended (the more samples, the better the end-results, because the end sample is more representative).
   - For a small garden or plot, 1 sample is sufficient.
2) Avoid extracting samples from soil presenting obvious anomalies and from border areas (near ditches and roads).
3) Sample quantity:
   Take the same quantity of soil for each sample. For example, use bags with similar dimensions (1 bag per sample).
4) Depth of extraction:
   General: dig and discard 5 cm (2") of topsoil
   For lawns: take the sample at a depth of 5 to 15 cm (from 2" to 6").
   For other plants (flowers, vegetables, shrubs): from 20 to 40 cm of depth (8" to 16").
   For trees: Samples from 20 to 60 cm of depth (8" to 24").
5) Mix all the samples together to obtain a homogeneous mixture of soil, discarding stones and vegetable residues.
6) From this mixture, take the quantity of soil that you need for the analysis.
7) Crumble the large chunks and distribute the soil sample on paper or plastic to air dry it.
8) Use a small bar to crush the air dried sample and pass it through the 2-mm soil sieve.

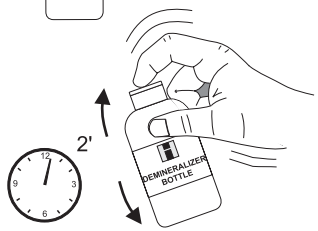


INSTRUCTIONS

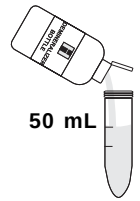
READ THE ENTIRE INSTRUCTIONS BEFORE USING THE KIT

- Remove the cap and fill the Demineralizer Bottle with tap water.

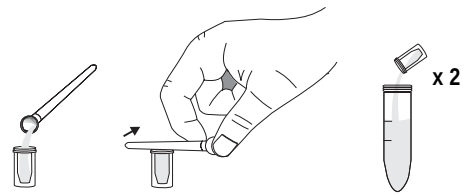
- Replace the cap and shake gently for at least 2 minutes. The demineralized water is now ready.



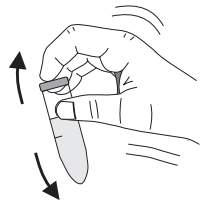
- Flip open the top of the Demineralizer Bottle cap. By gently squeezing the bottle, add demineralized water to the large (50 mL) test tube up to the 50 mL mark.



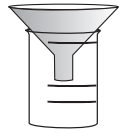
- Add 2 measures of the large (2 g) sample cup of Potassium Chloride (add full cups and discard the excess soil by using the spoon handle).



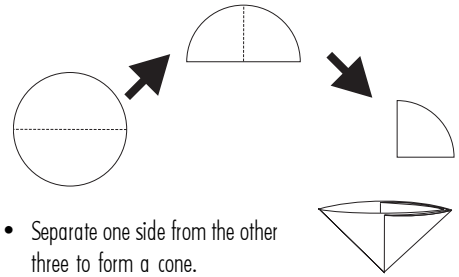
- Place the cap on the tube and shake it several times until the reagent has completely dissolved. The potassium chloride extractant solution is now ready.



- Place the funnel on the top of the beaker.

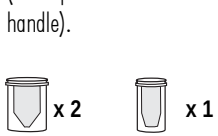


- Fold a filter paper disc twice as shown in the figure.

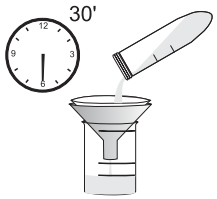


- Separate one side from the other three to form a cone.

- Place the folded filter disc into the funnel and wet it with some drops of deionized water.
- Add into the cone 2 measures of the large (2 g) sample cup and 1 measure of the small (1 g) cup of sieved soil (full cups but discard the excess soil by using the spoon handle).



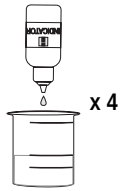
- Every 30 minutes add 10 mL of potassium chloride extractant solution to the soil in the cone. Repeat this operation 5 times.



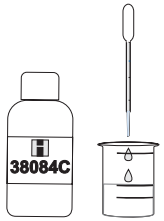
- Then rinse the soil sample twice, at 30 minute intervals, with 10 mL of deionized water. The extract is collected in the beaker.

DETERMINATION OF THE TOTAL EXCHANGEABLE ACIDITY

- Add 4 drops of Phenolphthalein Indicator to the extract and swirl to mix.



- Fill the pipette with HI 38084C-0 Titration Reagent. Add the titrant to the sample drop by drop, while swirling and keeping an accurate count of the number of drops being added to the solution.



- Keep adding the titrant until the pink color developed does not disappear upon gently swirling (the solution changes from colorless to pink).

- If necessary refill the pipette with titrant. Record the number of drops needed to obtain the color change and calculate the Total Exchangeable Acidity (TEA) as follows:

TEA (meq/100 grams of soil) = drops added/10

REFERENCES

APHA, AWWA, WEF, *Standard Methods,* 20th edition, 1998.
P. Sequi, *Chimica del suolo,* Patron Editore, Ed. 1991.

HEALTH AND SAFETY

The chemicals contained in this kit may be hazardous if improperly handled. Read the relevant Health and Safety Data Sheet before performing this test.